F²MC-16LX FAMILY
EVALUATION BOARD
FLASH-CAN-100

USER GUIDE

FUJITSU
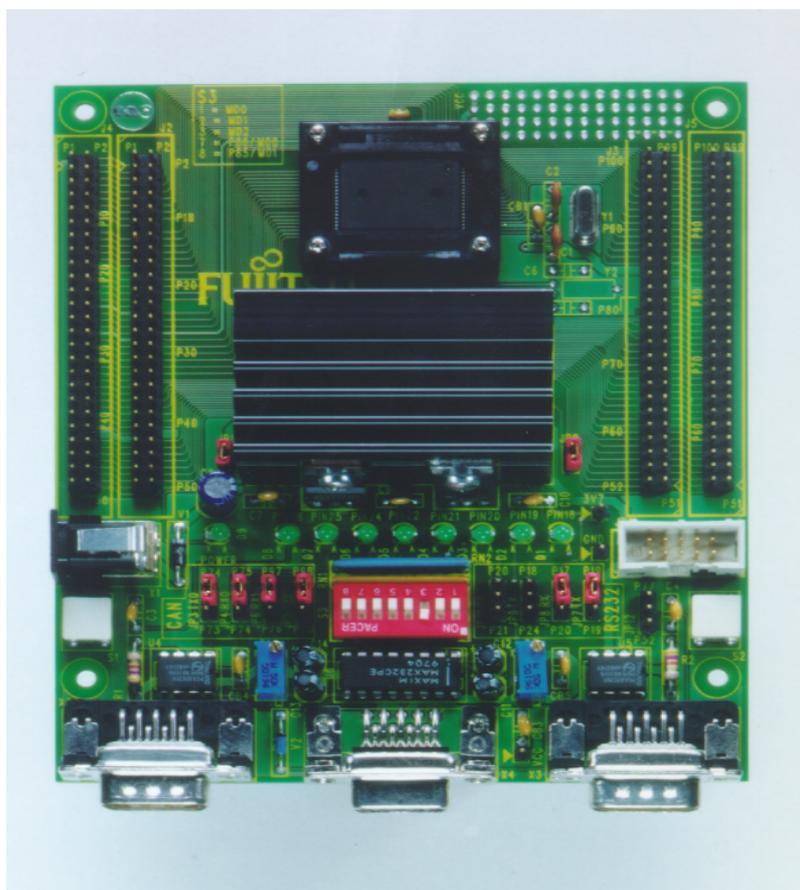
Revision History

Date	Version	Issue
07.12.98	V1.0	P14,P16 connected to JP7, JP8 (RS232 interface for MB90F594A) must be changed
07.12.98	V1.0	Jumper on JP10, JP9 Pin2+3 must be changed to Pin 1+2 to connect to UART1
07.12.98	V1.2	Silk-Plot: Version number must be added.
07.12.98	V1.2	Silk-Plot: SIT/SOT is not correct. Must be changed.
07.12.98	V1.2	Silk-Plot: CAN100BOARD is not correct.
07.12.98	V1.2	Silk-Plot: In RS232 Jumper area - naming of pins must be changed from Pxx to Pinxx.
07.12.98	V1.2	Silk-Plot: In CAN Jumper area - naming of pins must be changed from Pxx to Pinxx.
07.12.98	V1.2	JP13 was not placed on the board.
07.12.98	V1.2	Allow connection of X4 (RS232 Sub-D-9 female) Pin 7+8 on the DIP switch S3 Pin 5.
13.01.99	V1.1	Page 6 of this manual - item 6.4 not X3 – must be X4
01.02.99	V1.2	Fig. 2 – Schematic of Flash-CAN-100P-M06 misprint: External voltage supply plug must have Gnd on the inside and +12V on the outside.
03.02.99	V1.2	Disclaimer added to manual
03.02.99	V1.2	Manual revised to include information about Flash programming software tools, which in now available in this package
12.02.99	V1.2a	MB90580 series added – Can be used with this board also (only QFP 100 package!)
17.05.99	V2.0	Silk Plot changed to new Name: FLASH-CAN2-100P-M06
17.05.99	V2.0	New Socket Adapter for MCU used (NQPACK100RB)
17.05.99	V2.0	FLASH-CAN2-100P-M06 added in documentation
17.05.99	V2.0	Revised Silk plot in documentation
26.05.99	V2.0	Replace Pxx by Pixx in Chapter 5
26.05.99	V2.0	Chapter 6 – DIP-switch setting revised for asynchronous loader software
26.05.99	V2.0	Table1 + 2 added in this document
16.07.99		X0+X1 are not available on socket pin
16.07.99		V2.0: Connection of new socket adapter must be watched carefully. MCU might not have good contact
21.07.99	V2.1	Schematic of board added to this manual
05.08.99	V2.1	Attached Floppy modified to incl. Softune Worbench Projects see \readme.txt – Revision V1.2

Date	Version	Issue
23.08.99	V2.2	Table 2. MB90F543 UART0 is wrong – it must be UART1
17.04.00	V2.3	Table 2 corrected now
17.04.00	V2.3	Chapter 1.1. Regarding connectivity problems added. FLASH-CAN-100P-M06 is available again
09.01.01	V2.4	Support added for MB90F42x series
25.01.01	V2.5	Support for MB90F546G/GS and MB90F548G/GS series added, Description of Connector JP11 added
19.09.01	V2.6	Support for MB90440G series added, new disclaimer added
05.10.01	V2.7	New disclaimer corrected
13.02.02	V2.8	chapter 5.1 (MB90470) added Hardware: U6 changed to MAX3232CPE
22.08.02	V2.9	new style; MB90435, MB90480 added
07/02/03	V3.0	Disclaimer corrected
	V3.1	Series support, device list corrected
27.11.06	V3.2	Changed Socket Information

This document contains 20 pages.

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Contents

1 Overview

1.1 Abstract

This user guide describes the basic features of the new FLASH-CAN-100P-M06/FLASH-CAN2-100P-M06 board. This board can be used with almost all our 16LX microcontroller series supporting the FPT-100P-M06 package.

1.2 Introduction

The "Flash/CAN100"-board was developed in order to support customers and allow a fast software design start. Fujitsu emulators require a target system that provides Vcc and GND as well as an oscillation circuit. Additionally most of Fujitsu's flash microcontroller support the burn-in flash programming algorithm.

For the FLASH-CAN-100P-M06 board an IC149-100-114-B5 socket adapter is used. The suitable emulation probe cable is the MB2132-457.

On the FLASH-CAN2-100P-M06 board a NQPACK100RB socket adapter is assembled. This requires the MB2132-464 for the connection to the emulator.

This board must only be used for test applications in an evaluation laboratory environment.

1.3 Connectivity problems of the socket adapter

Some customers experience connectivity problems when connecting the MCU into the socket adapter. Only the small red screwdriver available in your box should be used to connect the cover (HQPACK) onto the socket (NQPACK).

If the four screws are not tightening equally, then it may cause a poor contact.

Do not screw the cover too tight (max 0.054 Nm). If you have connectivity problems then please loosen the screws and tighten again the screws equally.

Do not clean NQPACK, YQPACK, and YQSOCKET with steam. Cleaning material will contaminate inside of connector.

Customers using the FLASH-CAN-100P-M06 (with IC-149-100-114-B5 socket adapter) do usually not encounter this problem with the FLASH device.

2 Features

▸ a new 100-pin socket adapter for better connectivity

▸ 7-14V unstabilized external DC power supply possible

▸ 5V and 3.7V internal power supply available

▸ two high-speed CAN drivers

▸ one RS232 interface

▸ two identical pin connectors for all MCU pins

▸ optional sub-clock

▸ RST, HST push-button

▸ 8 User-LEDs

▸ external reset via RS232

▸ Flash-Programming Software for PC's

The target board will be delivered with the MB90F598G single-CAN, 128KByte flash microcontroller. This microcontroller contains the 'burn-in'-boot loader for programming the flash.

3 Supported Microcontroller Series

The target board was designed to work with many microcontrollers from the F²MC-16LX family. As it allows the programming of blank flash devices and supports high speed CAN interfaces, this board is ideal as a test at design start. The following microcontroller series can be used with this board:

- MB90420G = MB90V420G, MB90F428GA/GB/GC etc.
- MB90435   = MB90V540, MB90F437, MB90F438, MB90F439 etc.
- MB90440G = MB90V440G, MB90F443G etc.
- MB90470* = MB90V470B, MB90F474L, MB90F474H etc.
- MB90480* = MB90V480, MB90F481, MB90F482, MB90F483, etc.
- MB90540G = MB90V540G, MB90F543G/GS, MB90F546G/GS etc.
- MB90550   = MB90V550, MB90F553A, MB90553A, etc.
- MB90580   = MB90V580, MB90F583, MB90583, etc.
- MB90590G = MB90V590G, MB90F594/A/G, MB90594/A/G, MB90591/G, etc.
- MB90595G = MB90V595, MB90F598, MB90598, etc.

* modifications are necessary for FlashCAN100P-M06: see chapter 5.1

4 Deliverables

"FLASH-CAN-100P-M06"/"FLASH-CAN2-100P-M06" will be delivered with:

▸ the Flash/CAN100 board itself

▸ two 50pin socket connectors

▸ power supply connector

▸ MB90F598 - 128KB flash microcontroller

▸ 11 Jumper

▸ 1 socket adapter cover

▸ documentation

▸ Flash programming utility – floppy disc

For software add-ons please contact your local technical support team for the latest software release or Flash-Programming tools.

5 Configuration of the Evaluation-Board

The board is configured to work with the MB90F598 microcontroller.

In order to set up the board follow these steps:

1. disconnect power supply disconnected !

2. Set jumper JP1 to provide Vcc, i.e. 5V to the board

3. If case one is connecting this board to an emulator, it is recommended to set jumper JP2 in order to provide 3.7V to the internal core.

4. Please set the mode pins 1-3 on S3 according to your MCU operating mode. ON stands for 0 and OFF for 1. E.g. MB90F598 all switches to OFF except no. 3.

5. Adjust both potentiometers (P1, P2) clockwise to their end position.
   (Check that Pin 8 of U4 and Pin 8 of U5 are grounded.)

6. Select the appropriate CAN interface for the microcontroller you are using by setting jumper JP3-JP6. Note that Pixx on the silk plot stands for Pinxx, i.e. the pin number. E.g. for the MB90F598, set JP3 and JP4 to connect Pin 2 and 3 in order to connect to MCU Pins 74 and 75, respectively.

Target Series	CAN0		CAN1		CAN2	
	RX0	TX0	RX1	TX1	RX2	TX2
MB90425	Pin 75	Pin 74	n.a.	n.a.	n.a.	n.a.
MB90440	Pin 74	Pin 73	Pin 76	Pin 75	Pin 72 (Not supported by Jumper 3-6 !)	Pin 71
MB90470	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
MB90540	Pin 74	Pin 73	Pin 76	Pin 75	n.a.	n.a.
MB90545	Pin 74	Pin 73	n.a.	n.a.	n.a.	n.a.
MB90550	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
MB90583	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
MB90590	Pin 75	Pin 74	Pin 97	Pin 98	n.a.	n.a.
MB90595	Pin 75	Pin 74	n.a.	n.a.	n.a.	n.a.

Table 1: Microcontroller pin-number of the CAN-interface

7. Select the appropriate UART interface for the microcontroller you are using by setting jumper JP7-JP10.

8. Please use 1:1 cable for PC-connection.

Notes:

▸ Pixx on the silk plot stands for Pinxx, i.e. the pin number.
  e.g. for the MB90F598, set JP10 and JP9 to connect Pin 1 and 2 in order use UART 1

▸ MB90425, MB90470, MB90480 and MB90580 series are not supported by jumpers.
 Please make handwired connections for these controllers.

Target Series	Asynch. Com.	SIN / Jumper	SOT / Jumper
MB90425	UART1	handwire Pin 88 – JP10.2	handwire Pin 89 – JP9.2
		(Not supported by Jumper JP7 - JP10)	
MB90435	UART1	Pin 21 (JP10:1-2)	Pin 24 (JP9:1-2)
MB90440	UART1	Pin 21 (JP10:1-2)	Pin 24 (JP9:1-2)
MB90470	UART0	handwire Pin 27 – JP10.2	handwire Pin 28 – JP9.2
		(Not supported by Jumper JP7 - JP10) see chapter 6.1 !	
MB90480	UART0	handwire Pin 27 – JP10.2	handwire Pin 28 – JP9.2
		(Not supported by Jumper JP7 - JP10) see chapter 6.1 !	
MB90540	UART1	Pin 21 (JP10:1-2)	Pin 24 (JP9:1-2)
MB90545	UART1	Pin 21 (JP10:1-2)	Pin 24 (JP9:1-2)
MB90550	UART0	Pin 20 (JP8:1-2)	Pin 19 (JP7:1-2)
MB90580	UART0	handwire Pin 18 – JP10.2	handwire Pin 19 – JP9.2
		(Not supported by Jumper JP7 - JP10)	
MB90590	UART0	Pin 16 (JP8:2-3)	Pin 14 (JP7:2-3)
MB90595	UART1	Pin 21 (JP10:1-2)	Pin 24 (JP9:1-2)

Table 2: MCU pin-number used, for the asynchronous boot-loader software

5.1 Modifications for use with MB90470 / MB90480 series

Some modifications have to be done in order to use the FLASH-CAN-100P Board together with a MCU of the MB90470 / MB90480 series:

1. Check that U6 is MAX3232CPE

2. Change R6 470 => 390 Ohm. Check that output voltage of U3 is 3.3V (JP2)

3. Disassemble C10 (100nF)

4. Connect J4- Pin 27 to JP10- Pin 2 (SIN)

5. Connect J4- Pin 28 to JP9- Pin 2 (SOT)

6. Connect J5- Pin 80 to GND (X0A) if no Sub-Clock is used
   Otherwise Sub-Clock crystal Y2 and capacitors C5, C6 has to be assembled

7. Remove JP1. Connect JP1- Pin 2 to JP2- Pin 1

8. Emulator-Settings:
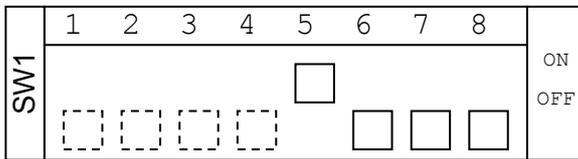
check emulator-manual for clock-selection-switch
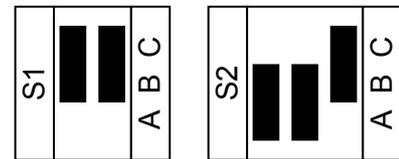
Only MB90470series:

The MB90470 series normally uses 3V power-supply. However, some Ports (P2, P3, P4 and P7) can operate with 5V. In this case Pin 23 (Vcc5) of the microcontroller has to be disconnected from Vcc on the FLASH-CAN-100P Board but has to be connected to +5V.

Cutting a trace near the capacitor CB2 on the bottom layer of the board only can do this.

Caution with the probe-cable:

The probe-cable MB2132-457 (Yamaichi socket) can NOT be used for dual voltage (Vcc3=+3V, Vcc5=+5V), because Pin 23 and Pin 84 (Vcc3 / Vcc5) are shortcut within the probe-cable.

## 5.1.1 Schematic of the modifications for MB90470 / MB90480
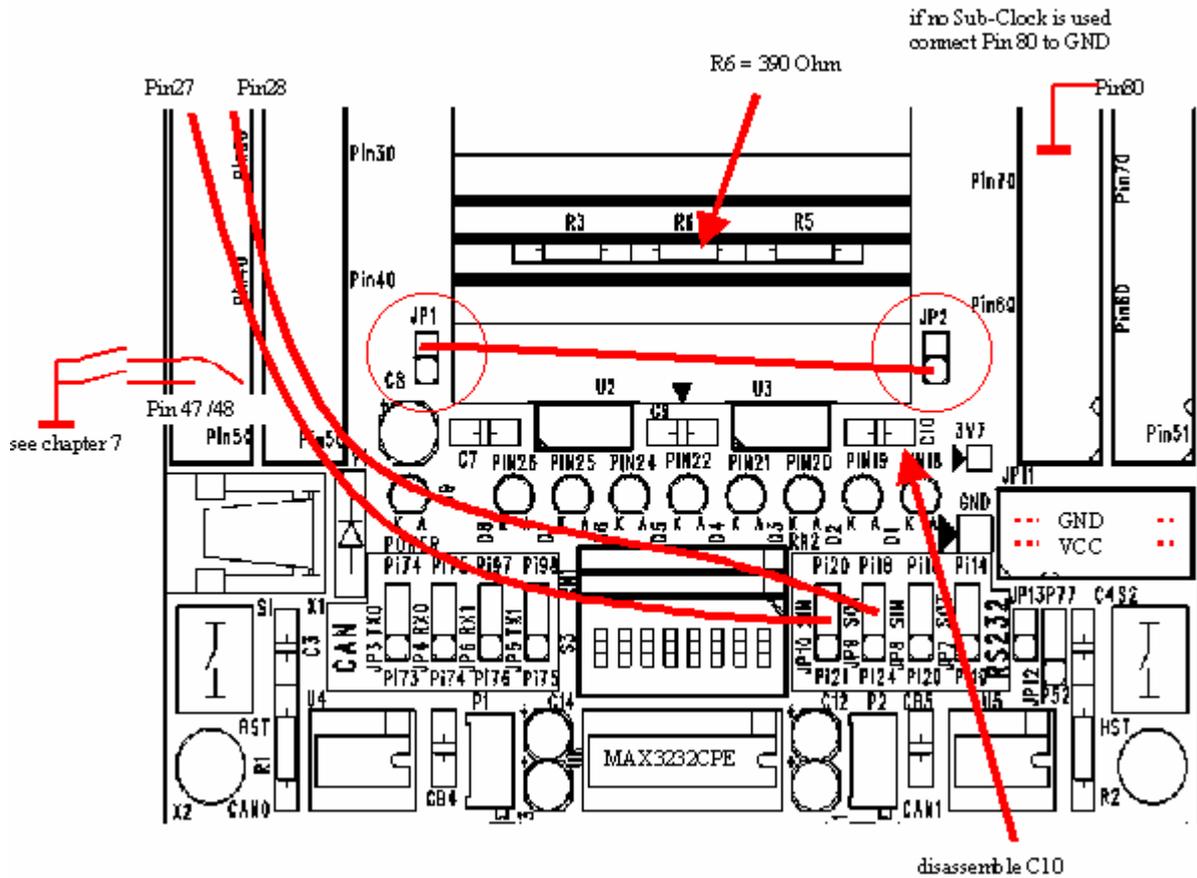
6 Using the Asynchronous Boot-Loader

The asynchronous boot-loader SW from Fujitsu can be used to program a blank flash microcontroller. This tool is available on the floppy disc. The following additional steps to chapter 5 need to be taken to set up the hardware (power supply disconnected!):

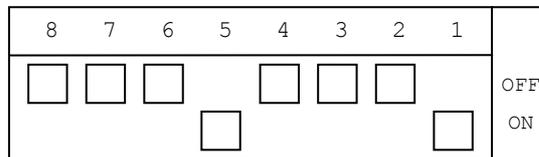1. Place the flash microcontroller in its socket (observe pin no. 1 position).

2. Set DIP switch (SW3) :

   1,5,7,8   ON
   2,3,4,6   OFF
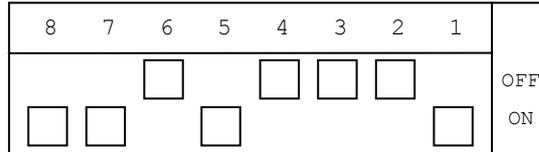
   MB90470 / MB90480 series only:

   1,5   ON
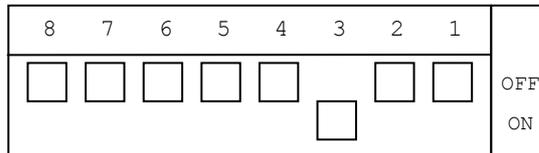   2,3,4,6,7,8 OFF

   additionally Pin 47 and 48 (Port P80,P81) have to be connected to GND
   for MB90470 and MB90480 series only (see chapter 5.1)

3. Switch on the power supply.

4. Start the asynchronous boot loader software and follow the instructions.

5. Set DIP switch (SW3)
   for RUN-Mode,
   e.g. Single-Chip-Mode

   3   ON
   1,2,4,5,6,7,8 OFF

   MB90470 / MB90480 series only:
   disconnect Pin 47 and 48 (Port P80,P81) from GND (see chapter 5.1)

6. Reset Target

7 Connectors

7.1 **Power connector** (X1)

The following figure shows the power connection jack X1. This connector is used to connect an external unregulated DC power supply voltage (9V-12V DC) to the evaluation board.

Connector X1:   Shield is connected to positive voltage supply

Centre is connected to ground (GND)
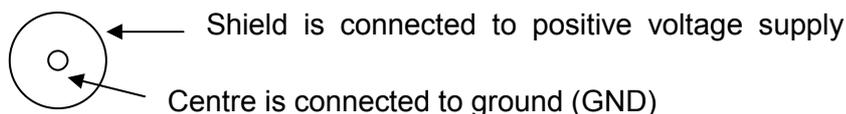
It is recommended to use 9V to keep the power dissipation to a minimum. Otherwise, an additional heat sink for the linear voltage regulator might be necessary.

7.2 **Edge connector** (J2, J3, J4, J5)

All pins of the microcontroller (QFP-100 package) are directly connected to J2, J3, J4 and J5, all are 2 x 25 Pin headers, as follows:
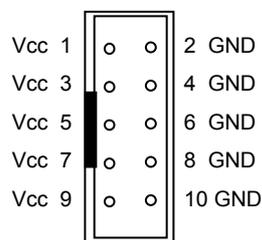
Connector	MCU Pins
J2, J4 (1 – 50)	1 – 50
J3, J5 (51 – 100)	51 – 100

The odd pin numbers are located on the one side and the even pin numbers are located on the other side of the connector.

On the PCB, the corresponding pin numbers of the µC are written next to the connector pins.

7.3 **GND/VCC** (JP11)

Additionally Vcc and GND Pins

are placed on the board (JP11).
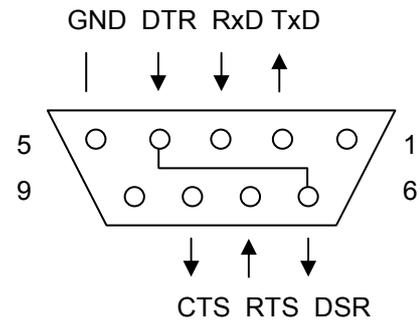

Pinning of JP11

7.4 **UART** (X4)

One 9-pin D-Sub female connectors are used
for the serial interface (UART).

TXD is the transmit output, RXD is the receive input.

The DTR signal can be used to generate a reset.
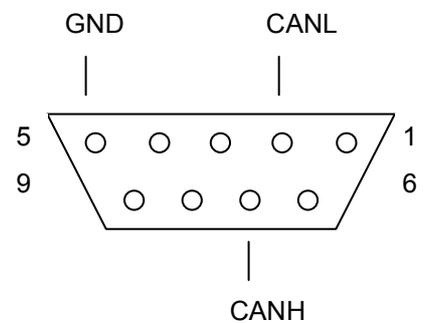
Please use 1:1 cable for PC-connection.

GND DTR RxD TxD

5   1
9   6

Connector X4:

CTS RTS DSR

7.5 **CAN Interface** (X2, X3)

Two 9-pin D-Sub male connector
are used for the CAN interface.

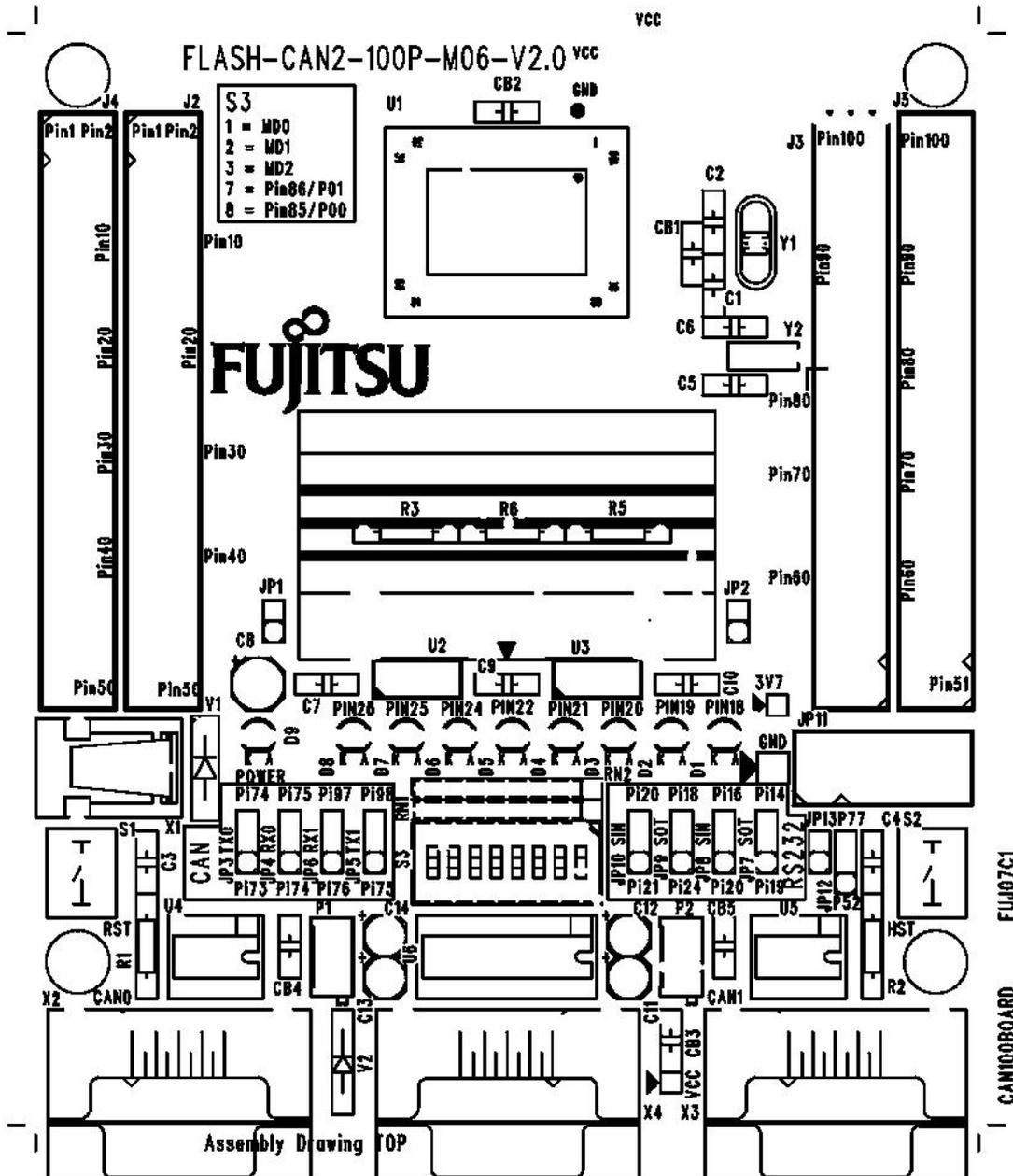Adjust both potentiometers (P1, P2) clockwise
to their end position.
(Check that Pin 8 of U4 and Pin 8 of U5 are grounded.)

GND   CANL

5   1
9   6

CANH

Connector X2, X3:

8 Silk-Plot of the board

Silk Plot of the new FLASH-CAN2-100P-M06

9 Schematic of the board

10 Related Products

▸ FLASH-CAN-100P-M06   Evaluation-board according to this user guide

▸ MB2132-457   Probe cable for socket: Yamaichi IC149-100-x14-y5
     Yamaichi: http://www.yamaichi.de

▸ FLASH-CAN2-100P-M06   New Evaluation board according to this user guide

▸ MB2132-464   Probe cable for socket: Tokyo Eletech:
     NQPack100rb / HQPack100rb179
     Tokyo Eletech: http://www.tetc.co.jp/nq/e_nq_draw.htm

▸ MB2141A/B   Emulator debugger main unit

▸ MB2145-507   Emulation POD

▸ MB90Vxxx   Evaluation chip (please refer to chapter 3)

▸ MB90Fxxx   Flash-Microcontroller (please refer to chapter 3)
     note: choose package FPT-100P-M06

11 Information in the WWW

Information about FUJITSU MICROELECTRONICS Products
can be found on the following Internet pages:

Microcontrollers (8-, 16- and 32bit), Graphics Controllers
Datasheets and Hardware Manuals, Support Tools (Hard- and Software)

http://www.fme.gsdc.de/gsdc.htm

Memory products: Flash, SDRAM and FRAM

http://www.fme.fujitsu.com/products/memory/index1.html

Linear Products: Power Management, A/D and D/A Converters

http://www.fme.fujitsu.com/products/linear/start.html

Media Products: SAW filters, acoustic resonators and VCOs

http://www.fme.fujitsu.com/products/media/index1.html

For more information about FUJITUS MICROELECTRONICS

http://www.fme.fujitsu.com/products/start.html